U S D A FOREST SERVICE
RESEARCH NOTE RM-290

FOREST SERVICE
U.S DEPARTMENT OF AGRICULTURE

CKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

A Nondestructive Method of Whole-Tree Sampling for Spring Cankerworm

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The use of a backpack mistblower and a pyrethrum compound facilitates whole tree sampling of insects without destroying the trees. This sampling method can be used as a general collecting tool or as a means of determining the density and mathematical distribution of insect populations.

Keywords: whole-tree sampling, *Paleacrita vernata*, insect control.

A convenient method of whole-tree sampling was developed for spring cankerworm (*Paleacrita vernata*) larvae in Siberian elm shelterbelts. This method measured the efficiency of other sampling techniques involving various units of the tree. It was also used to determine density and mathematical distribution of the larvae. A nondestructive technique was necessary because we could not afford to destroy the design or esthetic values of the shelterbelts. Other environmental considerations indicated that we use pyrethrum to take advantage of: (1) rapid knockdown which minimizes collection time, and eliminates interference from birds, small mammals, or turbulent weather; (2) low mammalian toxicity; (3) no phytotoxicity; and (4) no residue problems due to rapid breakdown by sunlight (Thomson 1967).

A number of different chemical knockdown techniques have been reported in the past. Collyer (1951) enclosed fruit trees with polyethylene sheets and applied pyrethrum as a mist. Polles and Payne (1973) found Pyrenone[2] was superior to jarring or using cone-shaped traps for checking pecan weevil, *Curculic caryae* (Horn), populations on the entire tree. Satchell and Mountford (1962) introduced a systemic insecticide through a bark frill on the main trunk. When properly applied, 95 percent of all lepidopterous larvae fell within 4 days of treatment. However, this systemic chemical method was practical only during calm weather when larvae were not blown away.

To evaluate the populations of spring cankerworms, Pyrocide (2 percent active) was utilized to obtain whole-tree samples. The area around selected trees was cleared of weeds and low branches for placement of a vinyl-covered nylon collecting mat. The mat covered an area of 24 m^2 with a slit from the center to the outer edge to encompass the tree trunk. The sample tree was then treated with a backpack mistblower (Stihl SG-17) at the rate of 75 ml per cubic meter of tree crown (fig. 1). The larvae were collected (fig. 2) and preserved in 70 percent alcohol for tabulation at a later date.

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[2]*Trade names are used for the benefit of the reader, and do not imply endorsement or preferential treatment by the U. S. Department of Agriculture.*

Figure 1.—
Mistblower application
of pyrethrin spray
to collect lepidoptera larvae.

The mistblower calibration for time in seconds (Y) required to apply a given volume of spray in ml (X) was

$$Y = -43.7 + 0.0972\ X.$$

Leafy crown volume (not total volume) is expressed as

$$V = 0.15\ DWH\ (2.2 + 0.42n)$$

where

V is crown volume (m^3)
D is depth of crown (m)
W is width of crown (m)
H is height of crown (m), and
n is number of leafy crown sides within the shelterbelt (0, 1, 2).

When the chemical application rate is 75 ml/m^3 of crown volume, then the two equations can be combined to express the time necessary for spraying a given tree as

$$Y = -43.7 + 1.09\ DWH\ (2.2 + 0.42n).$$

The cumulative percent of spring cankerworms that dropped from the tree was plotted against time measured at 10-minute intervals (fig. 3). Sixty-one percent (standard deviation = 3.5) of the cankerworm larvae fell within the first 10 minutes, and 92 percent within 30 minutes of spraying. The final 3 percent of the larvae were jarred from the trees at the end of 50 minutes. Visual examination of the crown verified that all larvae were collected after we jarred the tree.

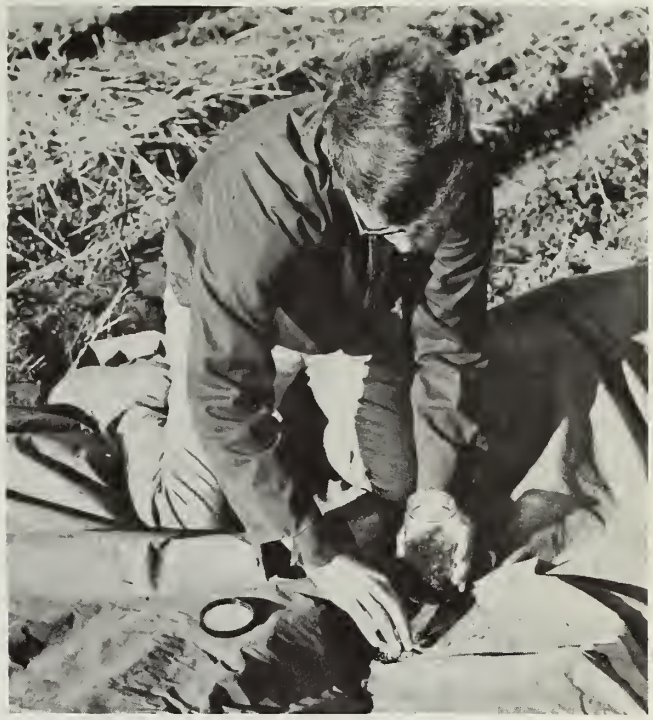

Figure 2.—

Spring cankerworm larvae

on the collection mat.

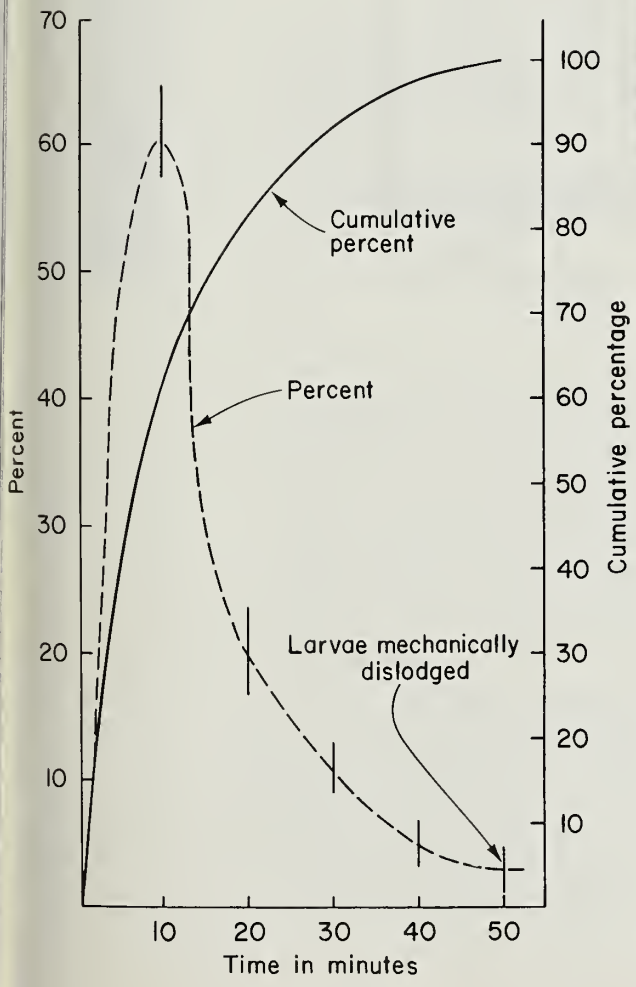

Figure 3.—Time sequence for collection of spring cankerworm larvae from five trees sprayed with Pyrocide. Vertical bars indicate standard deviation.

The procedure as described, is convenient to use on most trees under intensive culture. The same general format can be adapted to a hydraulic sprayer for tree heights in excess of 40 feet. This collection method was also used as a general survey tool. The authors were able to collect adult and immature specimens of Hemiptera, Homoptera, Hymenoptera, Diptera, Neuroptera, Ephimenoptera, Odonata, Orthoptera, Coleoptera, and several families of Araneida.

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